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A Comprehensive Review of Krimighnadi Kashaya in the Management of Sthaulya (Obesity): Bridging Classical Ayurvedic Wisdom with Modern Pharmacological Evidence

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ABSTRACT

Obesity, known in Ayurveda as Sthaulya or Medoroga, has emerged as a global epidemic with profound metabolic, cardiovascular, and psychosocial consequences. While modern medicine offers various pharmacological and surgical interventions, their long-term safety and efficacy remain concerns, necessitating exploration of safe, sustainable, and holistic therapeutic alternatives. Ayurveda, the traditional Indian system of medicine, provides a comprehensive framework for understanding and managing obesity through the principles of Dosha imbalance, Agni dysfunction, and Medo-dhatu vitiation. Krimighnadi Kashaya, a classical polyherbal formulation mentioned in Sahasrayogam, represents a promising Ayurvedic intervention for Sthaulya. This review provides a comprehensive analysis of Krimighnadi Kashaya by examining its classical references, individual ingredient profiles through the lens of Rasapanchaka (the five-fold pharmacological determinants), phytochemical composition, and pharmacological actions. The formulation comprises eleven ingredients Vidanga (Embelia ribes), Triphala (Terminalia chebula, Terminalia bellerica, Emblica officinalis), Ajaji (Cuminum cyminum), Katuki (Picrorhiza kurroa), Trikatu (Zingiber officinale, Piper longum, Piper nigrum), Guduchi (Tinospora cordifolia), Guggulu (Commiphora mukul), and Honey each possessing distinct Doshaghanta (humor-balancing) properties and pharmacological activities. Modern research corroborates the anti-obesity potential of these ingredients through multiple mechanisms: modulation of gut microbiota, enhancement of lipid metabolism, suppression of adipogenesis, improvement of insulin sensitivity, reduction of oxidative stress, and attenuation of chronic inflammation. Ongoing clinical trials evaluating Krimighnadi Kashaya in Sthaulya management further underscore its therapeutic relevance. This integrated review demonstrates that Krimighnadi Kashaya operates through a multi-targeted, systems-level approach to obesity management, aligning with both classical Ayurvedic principles and contemporary understanding of metabolic disease pathophysiology.

Keywords: Krimighnadi Kashaya, Sthaulya, Obesity, Ayurveda, Polyherbal formulation, Rasapanchaka, Metabolic syndrome

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1. INTRODUCTION

1.1 The Global Burden of Obesity

Obesity has become one of the most significant public health challenges of the twenty-first century, affecting over 650 million adults worldwide and contributing substantially to the global burden of non-communicable diseases. Characterized by excessive adiposity that impairs health, obesity is associated with increased risks of cardiovascular diseases, type 2 diabetes mellitus, hypertension, dyslipidemia, metabolic syndrome, certain malignancies, and sleep-disordered breathing. The multifactorial etiology of obesity encompasses genetic predisposition, environmental factors, dietary patterns, physical inactivity, psychological stress, and endocrine disturbances. Despite the availability of numerous pharmacological agents and bariatric surgical procedures, the management of obesity remains challenging due to limited efficacy, adverse effects, weight regain, and high costs. This therapeutic gap has renewed interest in traditional systems of medicine that offer holistic, individualized, and relatively safe approaches to weight management.

1.2 Ayurvedic Perspective on Sthaulya (Obesity)

Ayurveda, the ancient Indian medical system dating back over 3,000 years, conceptualizes obesity under the terms *Sthaulya* or *Medoroga*. According to classical Ayurvedic texts, *Sthaulya* is characterized by excessive accumulation of *Medo-dhatu* (adipose tissue) accompanied by derangement of *Kapha* and *Vata Doshas* [1]. The condition is included among the *Ashtau Nindita* (eight condemned bodily constitutions) due to its adverse impact on longevity, strength, agility, and overall quality of life.

The etiopathogenesis of *Sthaulya* involves multiple interconnected factors:

- **Dietary factors (*Ahara*):** Excessive consumption of *Guru* (heavy), *Snigdha* (unctuous), and *Madhura* (sweet) foods, along with over-nutrition, leads to *Kapha* vitiation and *Medo-dhatu* accumulation.
- **Lifestyle factors (*Vihara*):** Sedentary habits, lack of physical exercise, daytime sleeping (*Divasvapna*), and suppression of natural urges contribute to *Kapha* aggravation and metabolic sluggishness.
- **Digestive impairment (*Agnimandya*):** Diminished digestive and metabolic fire (*Agni*) results in improper metabolism and

the formation of *Ama* (metabolic toxins), which further vitiates *Doshas* and obstructs bodily channels (*Srotas*).

- **Tissue-specific metabolic dysfunction (*Medo Dhatvagnimandya*):** Impaired lipid metabolism at the tissue level leads to excessive *Medo-dhatu* formation and inadequate nourishment of other *Dhatus* (tissues).
- **Psychological factors:** Mental stress, anxiety, and emotional eating patterns are recognized as contributing factors to *Sthaulya*.

Ayurvedic management of *Sthaulya* adopts a comprehensive approach encompassing *Nidana Parivarjana* (avoidance of causative factors), *Ahara* (dietary modifications), *Vihara* (lifestyle interventions), and *Aushadha* (pharmacotherapy). The therapeutic strategies are directed toward *Deepana-Pachana* (enhancing digestion and metabolism), *Lekhana* (scraping or reducing excess tissue), *Medohara* (reducing fat), and *Srotoshodhana* (clearing bodily channels) [2].

1.3 The Role of Polyherbal Formulations in Obesity Management

Ayurvedic pharmacotherapy utilizes a vast repertoire of single drugs and polyherbal formulations for managing *Sthaulya*. Among these, *Krimighnadi Kashaya* occupies a significant position as a classical formulation indicated for *Kapha-Medo* disorders. The term "*Kashaya*" refers to a decoction prepared by boiling herbs in water, which represents one of the primary dosage forms in Ayurvedic medicine. *Krimighnadi Kashaya* derives its name from its primary ingredient *Vidanga* (*Embelia ribes*), which is traditionally known as *Krimighna* (vermicidal). However, the formulation extends beyond its anthelmintic properties to encompass a broad spectrum of therapeutic actions relevant to metabolic health [3].

1.4 Objectives of This Review

This comprehensive review aims to:

- Provide a detailed description of *Krimighnadi Kashaya* as per classical Ayurvedic texts
- Analyze each ingredient through the framework of *Rasapanchaka* (taste, qualities, potency, post-digestive effect, and specific action)
- Examine the phytochemical composition and pharmacological actions of individual constituents
- Integrate classical Ayurvedic wisdom with contemporary scientific evidence
- Elucidate the mechanistic basis of *Krimighnadi Kashaya* in obesity management
- Discuss ongoing clinical research and future directions

By bridging traditional knowledge with modern pharmacological understanding, this review seeks to enhance the scientific credibility of Ayurvedic interventions while preserving their foundational principles.

2. MATERIALS AND METHODS

2.1 Classical Textual Sources

The primary classical reference for *Krimighnadi Kashaya* is *Sahasrayogam*, a comprehensive Ayurvedic compendium of formulations compiled by various authors over centuries. The formulation is cited in the *Kashaya Prakarana* (decoction section) of this text [4]. Additional classical references were obtained from:

- **Charaka Samhita**: One of the foundational texts of Ayurveda, providing insights into the principles of *Chikitsa Chatushpaad* (four pillars of treatment), the concept of *Rasapanchaka*, and the pathophysiology of diseases [1,2,3]
- **Bhavaprakasha Nighantu**: A classical materia medica providing detailed descriptions of medicinal plants, including their synonyms, properties, and therapeutic indications [5]
- **Dravyaguna Vigyan** texts: Comprehensive Ayurvedic pharmacology texts elucidating the properties and actions of medicinal substances [6-15]

2.2 Literature Search Strategy

A systematic literature search was conducted to identify relevant scientific studies on the individual ingredients of *Krimighnadi Kashaya*. The search was performed using the following databases:

- PubMed/MEDLINE
- Google Scholar
- ScienceDirect
- Scopus

EMBASE

Search terms included the botanical names, Ayurvedic synonyms, and English common names of each ingredient, combined with terms such as "anti-obesity," "hypolipidemic," "metabolic syndrome," "phytochemistry," "pharmacology," and "clinical trial." The search period covered publications from 1965 to 2026.

2.3 Inclusion and Exclusion Criteria

Studies were included if they met the following criteria:

- Original research articles, reviews, or clinical trials
- Studies investigating the pharmacological actions relevant to obesity and metabolic health
- Studies providing information on phytochemical composition
- Studies published in peer-reviewed journals or recognized clinical trial registries

Studies were excluded if they:

- Focused exclusively on non-obesity-related actions without relevance to metabolic health
- Were not available in English or provided insufficient data for analysis
- Were duplicate publications or conference abstracts without full-text availability

2.4 Data Extraction and Synthesis

Data extracted from each source included: plant nomenclature, part used, *Rasapanchaka* properties, phytochemical constituents, pharmacological actions, dosage, and formulations. The information was synthesized to provide a comprehensive profile of each ingredient and its contribution to the overall therapeutic potential of *Krimighnadi Kashaya*.

3. RESULTS

3.1 Classical Description of Krimighnadi Kashaya

Krimighnadi Kashaya is a classical Ayurvedic formulation mentioned in *Sahasrayogam* (3/81). The formulation is indicated for *Sthaulya* (obesity) and conditions arising from *Kapha* and *Medo-dhatu* vitiation [4]. The classical verse describing the formulation emphasizes its role in addressing obesity and associated metabolic disturbances.

3.2 Composition of Krimighnadi Kashaya

Krimighnadi Kashaya comprises the following ingredients in specified proportions:

S.No.	Contents	Botanical Name	Part Used	Quantity
1	Vidanga	Embelia ribes	Fruit	1 Part
2	Triphala	Terminalia chebula, Terminalia bellerica, Emblica officinalis	Fruit	3 Parts
3	Ajaji (Jeeraka)	Cuminum cyminum	Fruit	1 Part
4	Katuki	Picrorhiza kurroa	Root/Rhizome	1 Part
5	Trikatu	Zingiber officinale, Piper longum, Piper nigrum	Rhizome/Fruit	3 Parts
6	Guduchi	Tinospora cordifolia	Stem	1 Part
7	Guggulu	Commiphora mukul	Gum	1 Part
8	Honey	-	-	-

3.3 Detailed Ingredient Profiles

3.3.1 Vidanga (Embelia ribes)

Botanical and Traditional Overview

Vidanga (*Embelia ribes* Burm.), belonging to the family Myrsinaceae, is a woody climbing shrub widely distributed across India, Southeast Asia, and other tropical regions. Known by various synonyms including *Krimighna*, *Amogha*, *Vella*, and *Jantuhantri*, the plant has been extensively utilized in traditional medicine for its diverse therapeutic properties [5,6].

Rasapanchaka Properties

The classical properties of *Vidanga* are described in *Bhavaprakasha Nighantu* as follows [5,6]:

Property	Description
Rasa (Taste)	Katu (pungent), Kashaya (astringent)
Guna (Qualities)	Laghu (light), Ruksha (dry), Tikshna (sharp)
Virya (Potency)	Ushna (hot)
Vipaka (Post-digestive effect)	Katu (pungent)
Doshaghanta	Vata-Kapha Hara (pacifies Vata and Kapha)
Karma (Actions)	Vishaghna (antitoxic), Krimighna (vermicidal), Dipana (digestive stimulant)
Rogaghanta (Indications)	Krimi (worm infestation), Udara (abdominal disorders), Adhmana (flatulence), Sula (pain), Kustha (skin diseases)

Phytochemical Composition

Embelia ribes is rich in bioactive phytoconstituents including benzoquinones, alkaloids, flavonoids, steroids, and phenolic compounds. The key chemical constituents include [6]:

- **Embelin** (2,5-dihydroxy-3-undecyl-1,4-benzoquinone): The primary bioactive constituent responsible for many pharmacological actions
- **Christembine**: An alkaloid with therapeutic properties
- **Homoembelin**: A related benzoquinone derivative
- **Vilangine**: Another bioactive compound
- **Quercitol**: A sugar alcohol
- Essential oils, flavonoids, and phenolic compounds

Pharmacological Actions

Modern pharmacological research has validated numerous traditional uses of *Vidanga* [6]:

- **Anti-obesity and anti-hyperlipidemic**: Studies have demonstrated significant correlations between *Vidanga* administration and reduced body mass index (BMI), along with improvements in metabolic markers such as triglycerides and cholesterol levels. Research evaluating the anti-obesity potential of *Embelia ribes* has shown promising results in both preclinical and clinical settings.
- **Antioxidant**: The essential oils and extracts exhibit potent free radical scavenging activity.
- **Anti-inflammatory**: Demonstrates significant anti-inflammatory properties.
- **Antimicrobial**: Exhibits antibacterial, antifungal, and antiviral activities.
- **Antidiabetic**: Shows potential in glycemic control.
- **Cardioprotective**: Beneficial effects on cardiovascular health.
- **Analgesic and anthelmintic**: Traditional uses validated by pharmacological studies.
- **Wound healing**: Promotes tissue repair and regeneration.
- **Antifertility**: Exhibits anti-spermatogenic activity.

Dosage and Formulations

- Powder dosage: 3-5 g
- Common formulations: *Vidangadi churna*, *Vidangadi loha*, *Vidangarista*

3.3.2 Triphala: Haritaki (Terminalia chebula)

Botanical and Traditional Overview

Haritaki (*Terminalia chebula* Retz.), belonging to the family Combretaceae, is one of the most revered medicinal plants in Ayurveda, often referred to as the "king of medicines." Known by synonyms including *Abhaya*, *Kayastha*, *Shiva*, and *Vijaya*, the fruit rind is the primary medicinal part [5,7].

Rasapanchaka Properties

Property	Description
Rasa	Kashaya (astringent), Tikta (bitter), Madhura (sweet), Katu (pungent), Amla (sour)
Guna	Laghu (light), Ruksha (dry)
Virya	Ushna (hot)
Vipaka	Madhura (sweet)
Doshaghanta	Tridoshashamaka (pacifies all three Doshas)
Karma	Tridoshahara, Anulomana (carminative), Rasayana (rejuvenative), Caksusya (beneficial for eyes), Hridya (cardiac tonic), Lekhana (scraping)

Phytochemical Composition [7]

- Tannins, anthraquinones, and polyphenolic compounds

- Chebulinic acid, chebulagic acid, tannic acid
- Terchebin, tetrachebulin
- Vitamin C (fruits)
- Arachidic, behenic, linoleic, oleic, palmitic, and stearic acids (fruit kernels)
- Chebulin (flowers)

Pharmacological Actions [7]

- **Hypolipidemic**: Reduces lipid levels through multiple mechanisms
- **Antimicrobial**: Broad-spectrum antibacterial and antifungal activity
- **Antioxidant**: Potent free radical scavenging

4. ANTI-STRESS AND ENDURANCE PROMOTING

5. ANTISPASMODIC AND HYPOTENSIVE

6. ANTI-HEPATITIS B VIRUS ACTIVITY

Dosage and Formulations

- Powder: 3-6 g
- Formulations: *Abhayarishta*, *Pathyadi kwath*, *Triphala churna*, *Triphala ghrita*, *Chitraka haritaki*, *Vaisvanara churna*, *Haritakileha*, *Agastya haritaki*

3.3.3 Triphala: Vibhitaki (Terminalia bellerica)

Botanical and Traditional Overview

Vibhitaki (*Terminalia bellerica* (Gaertn.) Roxb.), also belonging to the family Combretaceae, is known by synonyms including *Aksha*, *Karshaphala*, *Kalidruma*, *Bhutavasa*, and *Kaliyugalaya*. The fruit rind, seed, and seed kernel are used medicinally [5,8].

Rasapanchaka Properties

Property	Description
Rasa	Kashaya (astringent)
Guna	Laghu (light), Ruksha (dry)
Virya	Ushna (hot)
Vipaka	Madhura (sweet)
Doshaghanta	Kapha-Pitta Hara
Karma	Keshya (beneficial for hair), Chaksusya (beneficial for eyes), Bhedana (purgative), Madakari (intoxicating), Anulomana, Vajikarna (aphrodisiac)

Phytochemical Composition [8]

- Chebulagic acid, ellagic acid, gallic acid
- Fructose, galactose, glucose and its galloyl derivatives
- Mannitol and rhamnose
- β-Sitosterol and bellericanin
- Palmitic, oleic, and linoleic acids (kernel and its oil)

Pharmacological Actions [8]

- **Purgative**: Mild laxative effect

2. ANTIFUNGAL AND ANTIBACTERIAL

3. ANTIHISTAMINIC

4. ANTIASTHMATIC AND BRONCHODILATORY

5. ANTISPASMODIC

6. CNS STIMULANT

7. AMOEBICIDAL

8. ANTI-STRESS AND ENDURANCE PROMOTING

Dosage and Formulations

- Powder: 3-6 g
- Formulations: *Aksadi vati*, *Lavangadi vati*, *Triphala churna*, *Talisadi churna*

3.3.4 Triphala: Amalaki (Emblica officinalis)

Botanical and Traditional Overview

Amalaki (*Emblica officinalis* Gaertn.), belonging to the family Euphorbiaceae, is known as Indian gooseberry in English and *Amla* in Hindi. Synonyms include *Amalaki*, *Vayasya*, *Tishyaphala*, *Vrishya*, *Dhatriphala*, *Amritaphala*, and *Amalaka* [5,9].

Rasapanchaka Properties

Property	Description
Rasa	Amla (sour), Madhura (sweet), Kashaya (astringent), Tikta (bitter), Katu (pungent)
Guna	Guru (heavy), Ruksha (dry), Sheeta (cold)
Virya	Sheeta (cold)
Vipaka	Madhura (sweet)
Doshaghanta	Tridoshashamaka, especially Pittashamaka
Karma	Vayahsthapana (age-preserving), Rasayana (rejuvenative), Chaksusya, Vrishya

Phytochemical Composition [9]

- Rich source of Vitamin C
- Carotene, nicotinic acid, riboflavin
- D-Glucose, D-fructose, myoinositol
- Pectin with D-galacturonic acid, D-arabinosyl, D-xylosyl, L-rhamnosyl, D-glucosyl, D-mannosyl, and D-galactosyl residues
- Embicol, mucic acid, indole acetic acid
- Auxins (A1, A3, A4, A5)

Pharmacological Actions [9]

- **Hypolipidemic**: Reduces cholesterol and triglyceride levels
- **Antioxidant**: Potent free radical scavenging
- **Immunomodulatory**: Enhances immune function
- **Hypoglycemic**: Lowers blood glucose

5. ANTI-INFLAMMATORY AND ANTI-ULCER

- **Antimicrobial**: Antibacterial and antifungal

7. ANTITUMOR AND ANTIMUTAGENIC

8. ADRENERGIC POTENTIATING

9. MILD CNS DEPRESSANT

Dosage and Formulations

- Fresh juice: 10-20 ml
- Powder: 3-6 g

• Formulations: *Chyavanaprasa*, *Dhatriloha*, *Amalaki rasayana*, *Phalasava*, *Kankarishta*

3.3.5 Ajaji (Jeeraka) - Cuminum cyminum

Botanical and Traditional Overview

Ajaji or *Jeeraka* (*Cuminum cyminum* L.), belonging to the family Umbelliferae, is commonly known as cumin seeds. Synonyms include *Ajaji*, *Kana*, *Jarana*, *Dirgha jiraka*, *Sugandha*, and *Udgara* [5,10].

Rasapanchaka Properties

Property	Description
Rasa	Katu (pungent)
Guna	Laghu (light)
Virya	Ushna (hot)
Vipaka	Katu (pungent)
Doshaghanta	Kapha-Vata Hara
Karma	Dipana (digestive stimulant), Pacana (digestive), Balya (strengthening), Visya, Grahi (absorbent)

Phytochemical Composition [10]

• Cuminin, imperatorin, isoimperatorin
• Isoimpinellin, apigenin, apiin
• Oxalic acid, p-cymene

Pharmacological Actions [10]

1. ANTI-INFLAMMATORY AND ANTIOXIDANT

• **Antimicrobial**: Antibacterial, antifungal

3. ANTIMUTAGENIC AND IMMUNOMODULATORY

4. ANTI-ULCER AND ANTISPASMODIC

5. ANTIDIARRHEAL

6. ANTITUMOR

Dosage and Formulations

• Fruit powder: 3-6 g
• Formulations: *Jirakadi Modaka*, *Jiraka Ghrita*, *Jirakadya Churna*, *Jirakadi Taila*

3.3.6 Katuki (Picrorhiza kurroa)

Botanical and Traditional Overview

Katuki (*Picrorhiza kurroa* Royle ex Benth.), belonging to the family Scropulariaceae, is a small perennial herb found in the Himalayan region. Known by synonyms including *Asoka*, *Katumbhara*, and *Katvi*, the root and rhizome are used medicinally [5,11].

Rasapanchaka Properties

Property	Description
Rasa	Tikta (bitter)
Guna	Ruksha (dry), Laghu (light)
Virya	Sheeta (cold)
Vipaka	Katu (pungent)
Doshaghanta	Kapha-Pitta Hara
Karma	Bhedana (purgative), Lekhana (scraping), Dipana, Hridya

Phytochemical Composition [11]

• D-mannitol, kutkiol, apocyanin
• Kutkin, picroside I, II, and III
• Kutkoside, picrorhizin, arvenin III

Pharmacological Actions [11]

1. ANTI-INFLAMMATORY AND ANTIOXIDANT

2. ANTIMICROBIAL

3. ANTI-ULCER

4. ANTIASTHMATIC AND ANTIALLERGIC

5. ANTITUMOR

• **Hepatorestorative**: Protects and restores liver function

Dosage and Formulations

• Powder (therapeutic): 0.5-1 g
• Powder (purgative): 3-6 g
• Formulations: *Arogyavardhini vati*, *Tiktadya Ghrita*, *Katukadya Ghrita*

3.3.7 Trikatu: Sunthi (Zingiber officinale)

Botanical and Traditional Overview

Sunthi (*Zingiber officinale* Roscoe), belonging to the family Zingiberaceae, is commonly known as ginger. Synonyms include *Nagara*, *Mahaushadha*, *Vishwabheshaja*, and *Shringabera* [5,12].

Rasapanchaka Properties

Property	Description
Rasa	Katu (pungent)
Guna	Laghu (light), Snigdha (unctuous)
Virya	Ushna (hot)
Vipaka	Madhura (sweet)
Doshaghanta	Vata-Kapha Hara
Karma	Dipana, Bhedana

Phytochemical Composition [12]

Ginger contains a complex mixture of volatile oils and pungent principles:

• Heptane, octane, isovaleraldehyde, nonanol
• Pinene, camphene, β-pinene, sabinene, myrcene, limonene
• 1,8-Cineole, α-curcumene, β-farnesene
• Gingerol, zingerone, shogaol
• Dihydrogingerol, hexahydrocurcumin

• Gingerenone A, B, and isogingerone B

Pharmacological Actions [12]

1. ANTI-INFLAMMATORY

• **Hypolipidemic**: Reduces cholesterol and triglycerides

3. ANTI-EMETIC AND ANTI-ULCER

4. ANTIPLATELET

5. ANTIPYRETIC

6. CARDIOVASCULAR PROTECTIVE

7. ANTIOXIDANT AND ANTITUMOR

8. HEPATOPROTECTIVE

9. HYPOGLYCEMIC

10. ANALGESIC AND ANTIDEPRESSANT

• **Inhibition of prostaglandin release** (dose-dependent)

Dosage and Formulations

• Fresh juice: 5-10 ml
• Powder: 1-2 g
• Syrup: 2-4 ml
• Formulations: *Ardraka Rasayana*, *Ardraka Khandavalehya*, *Nagaradi Kashaya*, *Kottamchukkadi Tailam*, *Ardraka Ghrita*, *Ardraka Khanda*, *Soubhagya Shunti*, *Samasarkara Churna*

3.3.8 Trikatu: Pippali (Piper longum)

Botanical and Traditional Overview

Pippali (*Piper longum* L.), belonging to the family Piperaceae, is known as Indian long pepper. Synonyms include *Magadhi*, *Krishna*, *Kana*, *Chapala*, and *Ushana* [5,13].

Rasapanchaka Properties

Property	Description
Rasa	Katu (pungent)
Guna	Laghu (light), Snigdha (unctuous), Tikshna (sharp)
Virya	Anushna Sheeta (mildly cold)
Vipaka	Madhura (sweet)
Doshaghanta	Kapha-Vata Shamaka
Karma	Dipana, Vrishya (aphrodisiac), Rasayana

Phytochemical Composition [13]

• Piperlongumine and piperlonguminine (alkaloids)
• N-hexadecane, N-heptadecane, N-octadecane
• α-Thujene, terpinolene, zingiberene
• p-Cymene, p-methoxy acetophenone
• Dihydrocarveol, phenylethyl alcohol
• Sesquiterpenes

Pharmacological Actions [13]

1. ANTI-INFLAMMATORY

2. ANTIMALARIAL

3. CNS STIMULANT

4. ANTIHELMINTIC

5. HYPOGLYCEMIC

6. ANTISPASMODIC

Dosage and Formulations

• Powder: 0.5-1 g
• Formulations: *Pippalyadi Ghrita*, *Pippalyasava*, *Vyoshadi Vati*

3.3.9 Trikatu: Maricha (Piper nigrum)

Botanical and Traditional Overview

Maricha (*Piper nigrum* L.), belonging to the family Piperaceae, is commonly known as black pepper. Synonyms include *Maricha*, *Krishna*, and *Dharmapattana* [5,14].

Rasapanchaka Properties

Property	Description
Rasa	Katu (pungent)
Guna	Laghu (light), Tikshna (sharp), Ruksha (dry)
Virya	Ushna (hot)
Vipaka	Katu (pungent)
Doshaghanta	Kapha-Vata Hara
Karma	Dipana, Pramathi (scraping)

Phytochemical Composition [14]

• Pipercide (isobutylamide of 11-(3,4-methylenedioxyphenyl)-2E,4E,10E-undecatrienoic acid)
• N-Trans-feruloyltyramine
• Guineensine
• N-Isobutyl-2E,4E,8Z-eicosatrienamide
• N-Isobutyl-2E,4E-octadecadienamide

Pharmacological Actions [14]

1. ANTIOXIDANT

2. ANTICONVULSANT AND SEDATIVE

3. ANALGESIC

4. INSECTICIDAL AND PESTICIDAL

5. CNS DEPRESSANT AND MUSCLE RELAXANT

6. ANTIPYRETIC AND ANTI-INFLAMMATORY

7. ANTIFUNGAL AND ANTIMICROBIAL

8. HEPATOPROTECTIVE

9. ANTI-ULCER

10. ANTIBACTERIAL

• **Lipolytic**: Promotes fat breakdown

Dosage and Formulations

• Powder: 0.5-1 g

- Formulations: *Maha marichyadi taila*, *Marichyadi taila*, *Teka raja maricha*, *Agnitundi vati*, *Marichyadi churna*

3.3.10 Guduchi (Tinospora cordifolia)

Botanical and Traditional Overview

Guduchi (*Tinospora cordifolia* (Willd.) Miers), belonging to the family Menispermaceae, is known as Indian tinospora or heart-leaved moonseed. Synonyms include *Amritvalli*, *Chinnaruha*, *Tantrika*, *Chakralakshanika*, *Amrita*, and *Jivanti* [5,15].

Rasapanchaka Properties

Property	Description
Rasa	Tikta (bitter), Kashaya (astringent)
Guna	Guru (heavy), Snigdha (unctuous)
Virya	Ushna (hot)
Vipaka	Madhura (sweet)
Doshaghanta	Tridosha Shamak
Karma	Medhya (cognitive enhancing), Rasayana, Grahi, Dipaniya

Phytochemical Composition [15]

- Tinosporine, tinosporan, tinosporic acid
- Tinosporol, tinosporide, tinosporidine
- Columbin, chasmanthin, palmarin
- Barberine, giloin, giloinisin
- 1,2-Substituted pyrrolidine, diterpenoid, furanolactone
- Nonacosan-15-one, β-sitosterol
- Cordifolide, unosporin

Pharmacological Actions [15]

1. HYPOGLYCEMIC AND ANTIHYPERGLYCEMIC

2. CNS DEPRESSANT

3. ANTIBACTERIAL AND ANTIMICROBIAL

4. ANTIPYRETIC AND ANTI-INFLAMMATORY

5. ANALGESIC AND ANTIARTHRITIC

6. HEPATOPROTECTIVE

7. IMMUNOSUPPRESSIVE AND IMMUNOSTIMULANT

8. ANTINEOPLASTIC AND ANTITUMOR

9. ANTISTRESS AND ADAPTOGENIC

10. ANTIDIABETIC

11. ANTILEISHMANIAL AND ANTIOXIDANT

12. ANTIOXIDANT AND ANTI-ENDOTOXIC

13. HYPOTENSIVE AND DIURETIC

Clinical Evidence

A mechanistic review published in PubMed highlighted the beneficial effects of *Tinospora cordifolia* (giloy) on metabolic syndrome components, including hyperlipidemia, obesity, atherosclerosis, hypertension, and especially diabetes mellitus. The review gathered data demonstrating significant therapeutic potential in managing metabolic disorders [17].

Dosage and Formulations

- Stem powder: 3-6 g
- Decoction: 50-100 ml
- Formulations: *Guduchi Satva*, *Guduchi ghan Vati*

3.3.11 Guggulu (Commiphora mukul)

Botanical and Traditional Overview

Guggulu (*Commiphora mukul* (Hook. ex Stocks) Engl.), belonging to the family Burseraceae, is an oleo-gum resin obtained from the bark of the guggul tree. Known by synonyms including *Kousika*, *Palankasa*, and *Pura*, the gum resin has been used in Ayurveda since time immemorial [5,16].

Rasapanchaka Properties

Property	Description
Rasa	Tikta (bitter), Madhura (sweet), Katu (pungent)
Guna	Laghu (light), Tikshna (sharp), Snigdha (unctuous)
Virya	Ushna (hot)
Vipaka	Katu (pungent)
Doshaghanta	Tridoshahara
Karma	Rasayana, Vrishya, Lekhana

Phytochemical Composition [16]

- Volatile oil containing monoterpenoids, sesquiterpenoids, diterpenoids, and triterpenoids
- Steroids and flavonoids
- Guggultetrols and lignans
- Sugars and amino acids
- Guggullignans I and II
- Guggulu tetrols
- Mukulol, glycerol
- C-27 guggulusterols I, II, and III
- Z- and E-guggulusterol

Pharmacological Actions [16]

- **Hypolipidemic**: Reduces total cholesterol, LDL cholesterol, and triglycerides while potentially increasing HDL cholesterol

2. ANTI-INFLAMMATORY AND ANTIARTHRITIC

- **Anti-obesity**: Demonstrates potential in weight management by enhancing thyroid function and metabolism, though evidence remains preliminary
- **Cardioprotective**: Exhibits cardio-protective effects with collateral benefits against inflammation
- **Antidiabetic**: Shows anti-diabetic activity
- **Antifertility**: Exhibits anti-fertility effects

7. NEUROPROTECTIVE AND ANTICANCER

Clinical Evidence

Guggulu has been used for thousands of years in the treatment of arthritis, inflammation, gout, rheumatism, obesity, and disorders

of lipid metabolism. In 1986, guggul was approved for marketing in India as a cholesterol-lowering agent. Several studies suggest guggul may help reduce total cholesterol and LDL cholesterol levels while potentially increasing HDL cholesterol [17].

Dosage and Formulations

- Dosage: 2-4 g
- Formulations: *Yograja Guggulu*, *Simhanada Guggulu*, *Arogyavardhini Rasa*, *Navaka Guggulu*, *Amrtadi Guggulu*

3.3.12 Honey (Madhu)

Traditional and Modern Overview

Honey is a sweet food substance produced by honey bees from flower nectar through regurgitation and evaporation. It is stored as a primary food source in wax honeycombs within beehives. Most microorganisms do not grow in honey due to its low water activity of 0.672 [17].

Rasapanchaka Properties

Property	Description
Classical names	Madhu, Makshika, Madhvika, Kshaudra, Saraddha
Rasa	Madhura (sweet), Kashaya (astringent - Anurasa)
Guna	Ruksha (dry)
Virya	Sheeta (cold)
Vipaka	Katu (pungent)
Doshaghanta	Tridoshahara

Classification

According to *Acharya Charaka* and *Ashtang Sangraha*, honey is of four types [5]:

1. MAKSHIK

2. KSHUDRA

3. BHRAMAR

4. PAUTTIK

According to *Acharya Sushruta*, honey is of eight types [5]:

1. PAUTTIK

2. BHRAMAR

3. KSHUDRA

4. MAKSHIK

5. CHATTRA

6. AARDHA

7. AUDDHALAK

8. DAAL

Phytochemical Composition [17]

Honey contains flavonoids, a group of active natural compounds with a 15-carbon structure comprising two benzene rings joined by a heterocyclic pyrane ring. Flavonoids are generally classified as:

- Flavonols (quercetin, kaempferol, pinobanksin)
- Flavones (luteolin, apigenin, chrysin)
- Flavanones (naringenin, pinocembrin, hesperetin)
- Isoflavones (genistein)
- Anthocyanidins

Some flavonoids including genistein, chrysin, luteolin, and naringenin have been reported to show estrogenic activity and are often referred to as phytoestrogens [17].

Pharmacological Actions [17]

1. ANTIOXIDANT

2. ANTIMICROBIAL

3. ANTI-INFLAMMATORY

4. ANTIPROLIFERATIVE

5. ANTICANCER

6. ANTIMETASTATIC EFFECTS

Clinical Evidence

A comprehensive review published in *Pharmacognosy Research* examined the health benefits of honey, highlighting its therapeutic potential in various clinical conditions [17].

4. DISCUSSION

4.1 Integrating Classical Ayurvedic Principles with Modern Pharmacology

The management of *Sthaulya* (obesity) in Ayurveda represents a sophisticated systems-based approach that addresses the multifaceted nature of metabolic disease. *Krimighnadi Kashaya* exemplifies this integrative paradigm through its carefully selected combination of ingredients that target different aspects of obesity pathophysiology.

The formulation's effectiveness can be understood through the lens of *Rasapanchaka* the five-fold pharmacological determinants that govern drug action in Ayurveda. Each ingredient possesses specific *Rasa* (taste), *Guna* (qualities), *Virya* (potency), *Vipaka* (post-digestive effect), and *Prabhava* (specific action), which collectively determine its therapeutic profile. The combination of *Katu* (pungent) and *Kashaya* (astringent) tastes predominates in the formulation, with *Ushna* (hot) potency being the most common *Virya*. This profile aligns with the pathophysiology of *Sthaulya*, which is characterized by *Kapha* vitiation (requiring *Katu* and *Ushna* properties for pacification) and *Medo-dhatu* accumulation (requiring *Kashaya* and *Lekhana* actions for reduction).

4.2 Mechanistic Pathways in Obesity Management

Modern research has elucidated multiple mechanisms through which the ingredients of *Krimighnadi Kashaya* exert their anti-obesity effects:

4.2.1 Modulation of Gut Microbiota

The gut microbiome plays a crucial role in energy homeostasis, lipid metabolism, and systemic inflammation. Triphala extract has demonstrated significant potential in modulating gut microbial composition in obese individuals. Studies using dynamic in vitro human ascending colon models have shown that Triphala extract supplementation rapidly reduces *Proteobacteria* from 66.87% to 4.80% while increasing beneficial *Firmicutes* and *Bacteroidetes* [18]. Triphala also enriches beneficial families such as *Lachnospiraceae*, *Acidaminococcaceae*, and *Prevotellaceae* while reducing pathogenic groups including *Enterobacteriaceae* [18]. These microbial shifts are associated with improved metabolic health and reduced obesity-related complications.

4.2.2 Enhancement of Lipid Metabolism

Multiple ingredients in *Krimighnadi Kashaya* demonstrate hypolipidemic effects through distinct mechanisms:

- **Guggulu** reduces total cholesterol, LDL cholesterol, and triglycerides while potentially increasing HDL cholesterol. Its active constituents, guggulusterols, exhibit hypolipidemic activity with cardio-protective effects [16].
- **Triphala** and its components have shown effectiveness in reducing lipid levels, suppressing fat synthesis, accelerating beta-oxidation, and improving glucose tolerance in animal models of obesity [19].
- **Vidanga** (*Embelia ribes*) has demonstrated significant correlations with reduced BMI and improvements in metabolic markers such as triglycerides and cholesterol levels [6].

4.2.3 Suppression of Adipogenesis and Fat Accumulation

The combination of *Trikatu* (ginger, long pepper, black pepper) and other ingredients exerts anti-adipogenic effects through multiple pathways:

- **Ginger** (*Sunthi*) exhibits lipolytic activity and inhibits adipogenesis [12]
- **Black pepper** (*Maricha*) promotes fat breakdown through lipolytic actions [14]
- **Long pepper** (*Pippali*) enhances metabolic rate and reduces fat accumulation [13]

4.2.4 Improvement of Insulin Sensitivity and Glucose Metabolism

Guduchi (*Tinospora cordifolia*) has demonstrated beneficial effects on metabolic syndrome components, including hyperlipidemia, obesity, and especially diabetes mellitus [15]. *Triphala* has shown improvement in glucose tolerance and insulin sensitivity [7-9]. These effects are mediated through enhanced glucose uptake, reduced hepatic gluconeogenesis, and improved peripheral insulin sensitivity.

4.2.5 Reduction of Oxidative Stress and Inflammation

Chronic low-grade inflammation and oxidative stress are hallmarks of obesity and metabolic syndrome. The ingredients of *Krimighnadi Kashaya* possess potent antioxidant and anti-inflammatory properties:

- *Vidanga* exhibits significant antioxidant activity [6]
- *Triphala* demonstrates potent free radical scavenging [7-9]
- *Guduchi* shows antioxidant and anti-inflammatory effects [15]
- *Guggulu* exerts anti-inflammatory and anti-oxidant effects [16]
- Honey provides antioxidant and anti-inflammatory benefits [17]

4.2.6 Enhancement of Digestive and Metabolic Fire (Agni)

The *Trikatu* combination and other *Dipana* (digestive stimulant) ingredients enhance digestive and metabolic fire, improving overall metabolism and reducing *Ama* (metabolic toxins) formation. This aligns with the Ayurvedic principle that impaired *Agni* is central to the pathogenesis of *Sthaulya*.

4.3 Clinical Evidence and Ongoing Research

Several clinical studies are currently evaluating the efficacy of *Krimighnadi Kashaya* in *Sthaulya* management:

Study 1: A randomized clinical study on *Krimighanadi Kashaya* in *Sthaulya* with special reference to obesity is being conducted at the Jammu Institute of Ayurveda and Research. This single-arm, open-label, randomized pre-post clinical trial aims to evaluate the efficacy of *Krimighanadi Kashaya* in 30 participants aged 18-60 years with BMI 25-39.9 kg/m². The intervention will be administered for 30 days with follow-ups on days 15, 30, and 45, assessing both Ayurvedic and biomedical parameters. The study intends to generate evidence on the therapeutic potential, safety, and overall effectiveness of *Krimighanadi Kashaya* in improving obesity-related clinical outcomes and restoring metabolic balance [20].

Study 2: A randomized controlled trial is evaluating the efficacy of *Krumighnadi Kashaya* and *Varadi Kashayaya* in the management of *Sthaulya* with special reference to obesity. This phase 3 trial aims to enroll 72 participants and will assess lipid profile as the primary outcome. The rationale for conducting this study lies in the need for evidence-based medicine and aims to provide scientific validation for the traditional use of these formulations in managing obesity [21].

Study 3: An overview of *Krimighnadi Kashaya* in addressing *Sthaulya* (obesity) was published in *REDVET*, highlighting that *Krimighnadi Kashaya* reduces oxidative stress and reduces signs and symptoms of obesity. The review emphasized that *Sthaulya* in Ayurveda can be paralleled with obesity in modern science, which is a significant health concern arising from sedentary lifestyles, unhealthy dietary habits, lack of physical activity, and mental stress [22].

4.4 Synergistic Effects of Polyherbal Formulation

The polyherbal nature of *Krimighnadi Kashaya* offers several advantages over single-drug therapy:

- **Multi-targeted action**: Different ingredients target different aspects of obesity pathophysiology, providing comprehensive therapeutic coverage
- **Synergistic effects**: The combination may produce greater efficacy than individual components alone, as seen with *Triphala* and *Garcinia cambogia* combinations in obesity management [19]
- **Reduced toxicity**: Lower doses of individual ingredients in combination may reduce the risk of adverse effects
- **Balanced *Dosha* modulation**: The formulation addresses vitiation of multiple *Doshas* simultaneously, particularly *Kapha* and *Vata*
- **Enhanced bioavailability**: Certain ingredients (particularly *Trikatu*) may enhance the absorption and bioavailability of other components

4.5 Safety Considerations

While *Krimighnadi Kashaya* is generally considered safe based on traditional use, several safety considerations warrant attention:

- **Guggulu**: May interact with thyroid medications and other drugs; should be used with caution in patients with thyroid disorders [16]
- **Vidanga**: High doses may cause gastrointestinal irritation [6]
- **Trikatu**: May aggravate *Pitta* in susceptible individuals due to *Ushna* (hot) potency
- **Pregnancy and lactation**: Safety has not been established; use should be avoided or under strict medical supervision
- **Drug interactions**: Potential interactions with anticoagulants, antiplatelet drugs, and hypoglycemic agents should be considered

Ongoing clinical trials are expected to provide more comprehensive safety data [20,21].

4.6 Limitations and Future Directions

Despite the promising evidence, several limitations exist:

- **Limited high-quality clinical trials**: Most evidence is from preclinical studies or traditional knowledge; more randomized controlled trials are needed
- **Standardization challenges**: Variability in raw material quality, extraction methods, and formulation practices may affect consistency and reproducibility
- **Mechanistic understanding**: While multiple mechanisms have been proposed, the precise molecular pathways require further elucidation

- **Long-term safety and efficacy**: Long-term studies are needed to assess sustained effects and safety profile

Future research directions should include:

- Large-scale, multicenter randomized controlled trials with robust methodology
- Pharmacokinetic and pharmacodynamic studies to understand absorption, distribution, metabolism, and excretion
- Standardization of raw materials and finished products
- Investigation of potential drug interactions
- Exploration of the formulation's effects on specific obesity-related comorbidities
- Comparative studies with conventional anti-obesity medications
- Identification of biomarkers for predicting treatment response

5. CONCLUSION

Krimighnadi Kashaya represents a classical Ayurvedic formulation with significant therapeutic potential in the management of *Sthaulya* (obesity). The formulation's composition, grounded in the principles of *Rasapanchaka* and *Doshaghanta*, reflects a sophisticated understanding of metabolic disease pathophysiology that aligns remarkably well with contemporary scientific evidence.

The individual ingredients of *Krimighnadi Kashaya Vidanga*, *Triphala*, *Ajaji*, *Katuki*, *Trikatu*, *Guduchi*, *Guggulu*, and Honey possess diverse pharmacological actions relevant to obesity management, including modulation of gut microbiota, enhancement of lipid metabolism, suppression of adipogenesis, improvement of insulin sensitivity, reduction of oxidative stress, and attenuation of chronic inflammation [6-17]. Modern research has validated many of the traditional uses of these ingredients, providing a scientific basis for their inclusion in the formulation [18,19,22].

The polyherbal nature of *Krimighnadi Kashaya* offers a multi-targeted, systems-level approach to obesity management that addresses the complex, multifactorial nature of the disease. This integrated approach, combining classical Ayurvedic wisdom with modern pharmacological understanding, enhances the scientific credibility of Ayurvedic interventions while preserving their traditional wisdom.

Ongoing clinical trials evaluating *Krimighnadi Kashaya* in *Sthaulya* management underscore the growing recognition of Ayurveda's potential in addressing the global obesity epidemic [20,21]. As the world grapples with the increasing burden of obesity and its associated complications, traditional systems of medicine like Ayurveda offer valuable therapeutic alternatives that are safe, sustainable, and holistic.

The integration of Ayurvedic principles with modern biomedical research represents a promising pathway for developing effective, evidence-based interventions for obesity and metabolic disorders. *Krimighnadi Kashaya*, with its rich classical heritage and emerging scientific validation, exemplifies the potential of this integrative approach to address one of the most pressing health challenges of the twenty-first century.

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